Jc10 Rec'd PCT/PTO 03 DEC 2001

FORM PTO-1390 (Modified) (REV 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: **(H) 01PH0389USP**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR): **10/009444**

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/01796	**June 5, 2000**	**June 4, 1999**

TITLE OF INVENTION

Circuit for Carrying out Secured Data Transmission, Especially in Ring Systems

APPLICANT(S) FOR DO/EO/US

Meyer-Gräfe et al

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include itens (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☒ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). UNEXECUTED
10. ☒ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

General Authorization to Charge Fees

2 FORMAL DRAWINGS

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/009444	PCT/DE00/01796	(H) 01PH0389USP

24. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO	$1040.00	
☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO	$890.00	
☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO	$740.00	
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)	$710.00	
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)	$100.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =		$890.00
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).		$0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	24 - 20 =	4	x $18.00	$72.00
Independent claims	3 - 3 =	0	x $84.00	$0.00
Multiple Dependent Claims **(check if applicable)**.			☐	$0.00

TOTAL OF ABOVE CALCULATIONS =	$962.00
☐ Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.	$0.00
SUBTOTAL =	$962.00
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +	$0.00
TOTAL NATIONAL FEE =	$962.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐	$0.00
TOTAL FEES ENCLOSED =	$962.00
Amount to be: refunded	$
charged	$

a. ☒ PTO-2038 in the amount of **$962.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **11-0665** A duplicate copy of this sheet is enclosed.

d. ☒ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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20,430
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(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
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Veröffentlicht:
— *Ohne internationalen Recherchenbericht und erneut zu veröffentlichen nach Erhalt des Berichts.*

Zur Erklärung der Zweibuchstaben-Codes, und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(54) Title: CIRCUIT FOR CARRYING OUT SECURED DATA TRANSMISSION, ESPECIALLY IN RING BUS SYSTEMS

(54) Bezeichnung: SCHALTUNGSANORDNUNG ZUR GESICHERTEN DATENÜBERTRAGUNG, INSBESONDERE IN RINGFÖRMIGEN BUSSYSTEMEN

(57) Abstract: The invention relates to a circuit which enables data required for constructing failure tolerant structures to be transmitted on ring standard bus systems. To this end, a monitoring unit is required as well as decentralized input and output units which transmit or receive data used for regulating or controlling. The inventive circuit takes over the task of identifying possible faults which can jeopardize the process within a machine or system. Due to the internal structure, the circuit identifies a possible fault even before the fault with regard to the process is disclosed and initiates a secured disconnection. As a result, it is irrelevant whether the external control or the utilized bus system is responsible for creating the fault.

(57) Zusammenfassung: Die vorliegende Schaltungsanordnung erlaubt es, an ringförmigen Standardbussystemen Daten zu übertragen, die für den Aufbau fehlertoleranter Strukturen notwendig sind. Zur Realisierung benötigt man eine Überwachungseinheit und dezentrale Ein- und Ausgabeeinheiten, die Daten zur Regelung oder Steuerung senden oder entgegennehmen. Die Schaltungsanordnung übernimmt die Aufgabe, eventuelle Fehler zu erkennen, die für den Prozess innerhalb einer Maschine oder Anlage zur Gefahr werden können. Durch den internen Aufbau identifiziert die Schaltungsanordnung bereits vor der Fehleroffenbarung zum Prozess einen eventuellen Fehler und leitet eine gesicherte Abschaltung ein. Dabei ist es gleichgültig, ob die externe Steuerung oder das verwendete Bussystem für den Fehler verantwortlich ist.

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English Translation of the Annexes to the International Preliminary Examination Report

Circuit arrangement for protected data transmission, particularly in ring-shaped bus systems

Description

The invention relates to a circuit arrangement for protected data transmission, particularly in ring-shaped bus systems.

In machine and plant construction today, movements and processes are not infrequently controlled which represent a danger to the life and health of persons, particularly the operating personnel, in the case of a fault or if they fail. Apart from these dangers, however, valuable machine parts must also be protected which can suffer great financial damage in the case of possible malfunctions.

Any faults which may occur must, therefore, be recognized by the process or the existing control facilities and the machine should always be driven in a state which can be considered safe. As a rule, redundant structures are necessary for this which monitor the safety functions independently of the actual control. In machine or plant construction, detection of a single error is frequently sufficient for fault detection. After this fault has been detected, the control process can then be interrupted and stay in a safe state. This prevents any damage by faulty continuation of the process.

The methods for fault detection and the measures necessary for these are stated in international standards DIN V VDE 0801 and DIN ISO 61508. By means of the principles given in these standards, the manufacturers of automation equipment have developed in recent years different strategies which allow safe transmissions on bus systems, see, for example, the

"profibus with F-Profil, PNO and safety-bus P by Pilz and Sick.

In addition, control systems will reach the market which already have internally redundant structures and thus, in interplay with said safe bus systems, allow fault detection; see, for example, the bus systems from Siemens, particularly the equipment series S 7 400 F, or the PSS 3000 series by Pilz.

However, the methods implemented there can only be used with completely new installation of the necessary components and protect only inadequately against systematic faults.

Instead, the invention has the object of detecting faults in a process which is only built up with standard units.

In addition, it should preferably be not only any faults occurring in the transport of data via a bus system used, but also disturbances or programming errors in the control device which are detected and eliminated.

The circuit arrangement thus represents an implementation of a method which has already been filed under the post-published patent no. 198 57 683.8, the full extent of the content of which is also made the subject matter of the present patent application by reference.

The method is particularly suitable for all ring-shaped bus systems, the technology described being optimally adapted for the interbus standard. In this case, a requirement profile was already worked out at the beginning of 1999 and then published, IEE journal, April 1999, Karsten Meyer-Gräfe: "Interbus goes Safety".

In the text which follows, the invention is described in more detail, referring to preferred embodiments and the attached drawings, in which:

Fig. 1 shows the configuration for a first embodiment of a system for protected data transmission,

Fig. 2 shows the internal configuration of the peripheral safety-related unit of the system for protected data transmission.

In the text which follows, the invention will be described in greater detail, initially by referring to Fig. 1. Fig. 1 shows a suitable configuration for such a system.

The control unit (1) handles all control functions in the process as is known, for example, from the conventional interbus system. The control unit (1) also detects possible faults and can interrupt processes or bring them to a safe state.

In the case of its own failure or in the case of faulty data transport, however, the control unit (1) is conventionally not able to produce the desired safe state. This failure also occurs, for example, if there is extensive separation between process control and safety control in the control system. Since there is conventionally no redundancy here, either, an undetected fault may have grave consequences.

According to the invention, other components are added which detect and eliminate a possible fault. These units are: a peripheral monitoring unit (4) and one or more peripheral safety-related units (9) in the process, which are only necessary where safety-related data are received or transmitted.

The control unit (1) contains a data map register (2) which sends all output data and other checking signals via the data line (13) to the peripheral units (7, 8, 12, peripheral safety-related unit 9 and peripheral monitoring unit 4).

Since the bus transport works in a similar way to a shift register, all peripheral units send their input data to the control unit in the same bus cycle via the return line (14) and these data are available in the data map register (3). In a subsequent SPC (stored-program control) cycle, the SPC then processes the data from its two map registers (2, 3) and thus generates the necessary

state for the process.

Without the peripheral monitoring unit (4) and the peripheral safety-related unit (9), however, the SPC is not capable of controlling a programming error, a state due to disturbance or failure or a data error due to the wrong bus transport. The peripheral monitoring unit (4), therefore, contains its own microprocessor which monitors the transmitted data of the SPC and only examines the safety-related quantities for appropriateness, particularly their correctness.

Thus, the peripheral monitoring unit (4) with the transfer unit (5) is capable of monitoring the SPC. However, the peripheral monitoring unit (4) can also additionally read the data of the inputs of the peripheral units via the transfer unit (6) installed in the return path. Since the peripheral safety-related unit (9) also forwards its output information (D3) directly to the input section of the bus unit (23), it is possible to check directly whether the bus transfer has worked correctly.

Furthermore, the peripheral monitoring unit (4) with its transfer unit (5) is also capable of manipulating the data for the peripheral safety-related unit (9). In particular, the peripheral monitoring unit (4) can overwrite data of the SPC and thus prevent agreement with the data output from the peripheral safety-related unit (9). The peripheral safety-related unit (9) becomes active only if it has received an agreement for the data of the output unit (10) via the checking unit (11).

The timing with the data transport is shown in the following table:

Sh	MT	ST		1		2		D3		C3		4		SR		MR
		A	E	A	E	A	E	A	E	A	E	A	E	A	E	
0	LBW		ST		E1		E2		E3		EC3		E4		ESR	
1	ASR	LBW	LBw	ST	ST	E1	E1	E2	E2	E3	E3	EC3	EC3	E4	E4	ESR
2	A4	ASR	ASR	LBw	LBW	ST	ST	E1	E1	E2	E2	E3	E3	EC3	EC3	E4
3	1	A4	A4	ASR	ASR	LBW	LBW	ST	ST	E1	E1	E2	E2	E3	E3	EC3
4	A3	1	AC3	A4	A4	ASR	ASR	LBW	LBW	ST	ST	E1	E1	E2	E2	E3
5	A2	A3	A3	AC3	AC3	A4	A4	ASR	ASR	LBW	LBW	ST	ST	E1	E1	E2
6	A1	A2	A2	A3	A3	AC3	AC3	A4	A4	ASR	ASR	LBW	LBW	ST	ST	E1
7	ST	A1	A1	A2	A2	A3	A3	AC3	AC3	A4	A4	ASR	ASR	LBW	LBW	ST
8		ST	ST	A1	A1	A2	A2	A3	A3	AC3	AC3	A4	A4	ASR	ASR	LBW

The timing diagram shows the state after each shift information in the ring by means of a preferred example, the Interbus system by Phoenix Contact GmbH and Co. KG.

The information AC3 can be manipulated by the peripheral monitoring unit (4) with the transfer unit (5) and can be overwritten. The peripheral safety-related unit (9) thus receives in its checking logic (11) an additional information item which prevents a faulty output.

As can also be seen from the timing diagram, the peripheral monitoring unit (4) can also read the data of the output from the peripheral safety-related unit (9) (EC3). These data represent the direct output information of the peripheral safety-related unit (9) so that a bus error is reliably detected.

The internal configuration of the peripheral safety-related unit (9) is shown in figure 2.

The peripheral safety-related unit (9) consists of two bus units (22, 23) so that input information can be fetched redundantly (24, 25). In addition, the output information Dn from a bus unit (22) is mapped via the input section of the other bus unit (23). A possible error in the internal storage or during the bus transport is thus detected in the subsequent cycle of the bus transport. The output information Dn is written into the buffer (7) by the control unit (SPC).

However, the checking logic (11) additionally decides whether the information of the buffer (7) appears at the peripheral unit via the output logic (28). This checking logic (11) can either release the stored information via the line (30) or delete the state via the line (31) so that the output (29) brings the control process into a safe state.

In principle, however, the circuit arrangement operates in many areas just like a normal decentralized SPC system. The components merely additionally allow inputs to be redundantly

monitored and stored output information to be examined for appropriateness, particularly freedom from faults before it is output. Furthermore, the monitoring unit can also detect faults which have not only been produced by failure or disturbance but were caused by an error in programming or parameterizing.

The present circuit arrangement thus allows data which are necessary for configuring fault-tolerant structures to be transmitted on standard ring-shaped bus systems.

To implement the invention, a monitoring unit and peripheral input and output units transmitting or receiving data for control purposes are used.

The circuit arrangement handles the task of detecting any faults which can become a danger for the control process, particularly for the transmission of control, sensor or actuator data, within a machine or plant. Due to its internal configuration, the circuit arrangement identifies a possible error even before the error is transmitted to the control process and initiates a protected switch-off. In this arrangement, it is of no importance whether it is the external control unit or the bus system used which is responsible for the error.

Claims

1. A system for protected data transmission in ring-shaped bus systems, comprising

- a control unit (1) which sends output data and checking signals for a control process to peripheral units (4, 7, 8, 9, 12),

- a peripheral monitoring unit (4) which has a first transfer unit (5) for monitoring the transmitted data and a second transfer unit (6) for monitoring data to be read back into the control unit (1), and

- at least one peripheral safety-related unit (9) for receiving or transmitting safety-related data, in which data are temporarily stored for output, which has a checking logic (11) for monitoring the temporarily stored data and an output unit (10) for outputting the temporarily stored data,

the temporarily stored data being monitored by the checking logic (11) in such a manner that, in the case of a fault, a safe state of the output unit (10) for the control process is initiated,

the first transfer unit (5) monitoring the data sent out by the control unit (1), in such a manner that, in the case of a fault, release data for the peripheral safety-related unit (9) are suppressed or deleted so that the faulty data do not reach the control process, particularly data transmission sequences, wherein the input data of the peripheral safety-related unit (9) and its temporarily stored data are read back via the second transfer unit (6).

2. The system as claimed in claim 1,

characterized in that

the temporarily stored data and the input data of

the peripheral safety-related unit (9) are provided to the peripheral monitoring unit (4).

3. The system as claimed in claim 1 or 2,

characterized in that

the peripheral safety-related unit (9) reads back

the temporarily stored data via a bus unit (23).

4. The system as claimed in claims 1 to 3,

characterized in that

the peripheral safety-related unit (9) has a buffer

(27) which is read back by a bus unit (23) and is thus checked by the peripheral monitoring unit (4) even before release to the control process, particularly of data transmitted via the bus, via the output logic (28) with the output signal (29).

5. The system as claimed in claims 3 or 4,

characterized in that

the peripheral safety-related unit (9) comprises a

further bus unit (22) so that the peripheral safety-related unit (9) has redundant input channels (24, 25) and thus redundantly monitors the connected control process and can detect a fault.

6. The system as claimed in claims 1 to 5,

characterized in that

the checking logic (11) decides whether the data stored in the buffer (27) are output via the output logic (28).

7. The system as claimed in claims 1 to 6,

characterized in that

the checking logic (11) releases or deletes the temporarily stored data.

8. The system as claimed in claims 1 to 7,

characterized in that

the peripheral monitoring unit (4) with the first transfer unit (5) is capable of manipulating the data for the peripheral safety-related unit (9).

9. The system as claimed in claims 1 to 8,

characterized in that

the peripheral monitoring unit (4) overwrites data of the SPC.

10. The system as claimed in claim 1 to 9,

characterized in that

the agreement to a data output from the peripheral safety-related unit (9) is prevented by the overwriting of the data.

11. The system as claimed in claim 1 to 10,

characterized in that

the checking logic (11) receives from the peripheral monitoring unit (4) an information item which prevents a faulty output.

12. The system as claimed in claims 1 to 11,

characterized in that

the peripheral safety-related unit (9) only becomes active if it has received an agreement for the data of the output unit (10) via the checking unit (11).

13. The system as claimed in claims 1 to 12,

characterized in that

the peripheral units (4, 7, 8, 9, 12) themselves can perform logic operations and thus a higher process speed is achieved in the overall combined operation.

14. The system as claimed in claims 1 to 13,

characterized in that

the peripheral monitoring unit (4) itself handles

control functions and thus a combined operation with a safety control unit is produced.

15. The system as claimed in claims 1 to 14,

characterized in that

the peripheral safety-related unit (9) manages with

standard non-safety-related modules for the bus traffic and does not need any special safety-related modules.

16. The system as claimed in claims 1 to 15,

characterized in that

the function is operable in standard bus systems

and is capable of operating without additional installation of further bus systems or special components.

17. The system as claimed in claims 1 to 16,

characterized in that

the function can be installed subsequently by

adding the peripheral monitoring unit (4) and exchanging normal peripheral units for peripheral safety-related units (9).

18. The system as claimed in claims 1 to 17,

characterized in that

the safety function of the system can also be

subsequently expanded by adding hardware elements or software modules.

19. The system for protected data transmission,

particularly in ring-shaped bus systems,

in which a peripheral monitoring unit (4) checks

the data sent out by a control unit (1) and examines them for faults and in the case of a fault suppresses or deletes release data for a peripheral safety-related unit (9) so that a fault cannot reach the control process, particularly not data transmission sequences.

20. The system as claimed in claim 19,

in which temporarily stored data of the peripheral

safety-related unit (9) are read via a bus unit (23) and are monitored and detected by a checking logic (11).

21. The system as claimed in claim 19 or 20,

in which a safe state of data transmission,

particularly of the output unit (10), is initiated by the checking logic (11).

22. A peripheral safety-related unit in a system for

protected data transmission in ring-shaped bus systems,

comprising

- two bus units (22, 23), to forward the output

data of a bus unit (22) also to the input section of the other bus unit (23) in order to be able to fetch information from the control process via redundant input channels (24, 25) and in order to provide the output data of a peripheral monitoring unit (4) for read-back,

- a buffer (27) in which the output data are stored before their release,

- an output logic (28) via which the temporarily stored data are output, and

- a checking logic (11) which decides whether the data stored in the buffer (27) are output via the output logic (28).

23. The peripheral safety-related unit as claimed in claim 20,

characterized in that

the checking logic (11) releases or deletes the temporarily stored data.

24. The peripheral safety-related unit as claimed in claims 22 or 23,

characterized in that

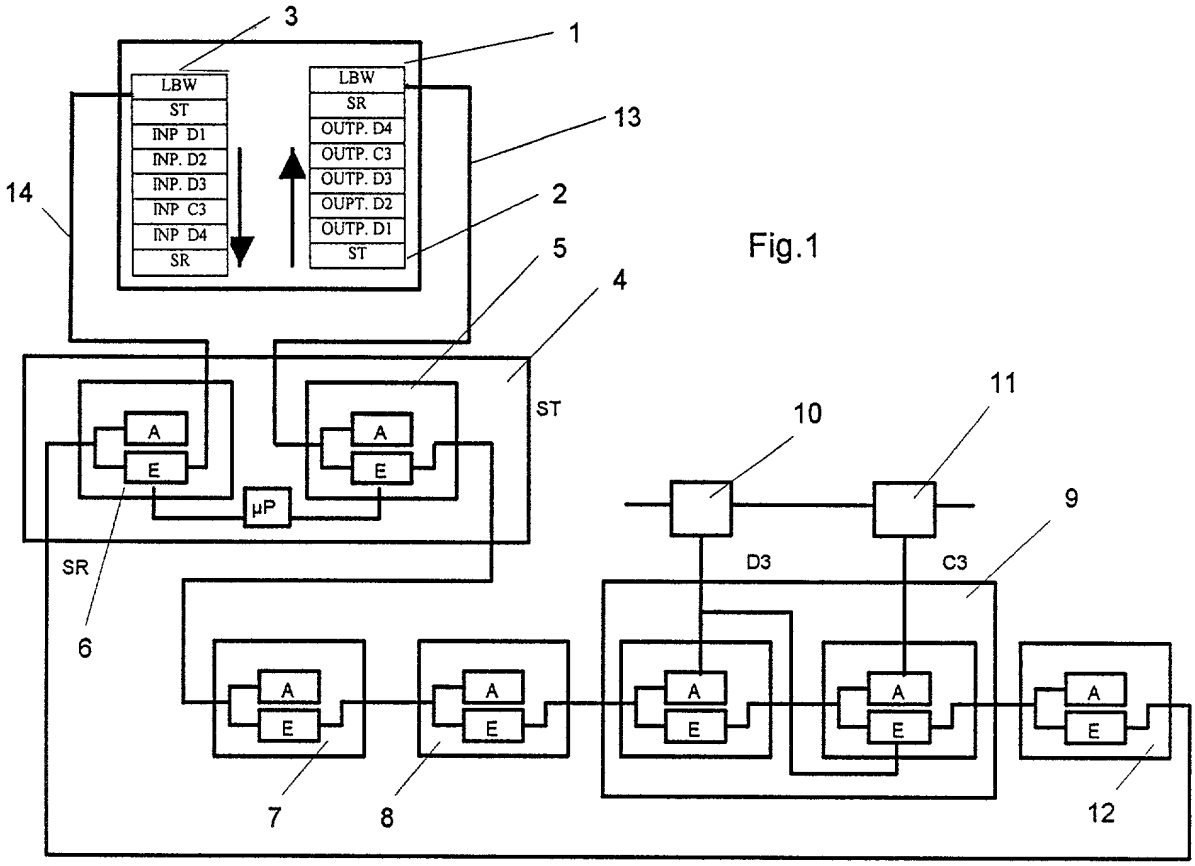
the checking logic (11) receives information from the peripheral monitoring unit (4) in order to be able to prevent a faulty output by this means.

Abstract

The present circuit arrangement allows data, which are necessary for building up fault-tolerant structures, to be transmitted on standard ring-shaped bus systems. Its implementation requires a monitoring unit and input and output units which transmit or receive data for control.

The circuit arrangement handles the task of detecting any faults which can become a danger for the process within a machine or plant. Due to its internal configuration, the circuit arrangement identifies any fault even before the detection of the fault and initiates a protected switch-off. In this arrangement, it is of no importance whether it is the external control unit or the bus system used which is responsible for the fault.

20050404.0350


3
1
LBW
ST
INP D1
INP. D2
INP. D3
INP C3
INP D4
SR
LBW
SR
OUTP. D4
OUTP. C3
OUTP. D3
OUPT. D2
OUTP. D1
ST
13
14
2
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ST
A
E
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SR
6
10
11
9
D3
C3
7
8
12

Fig.1

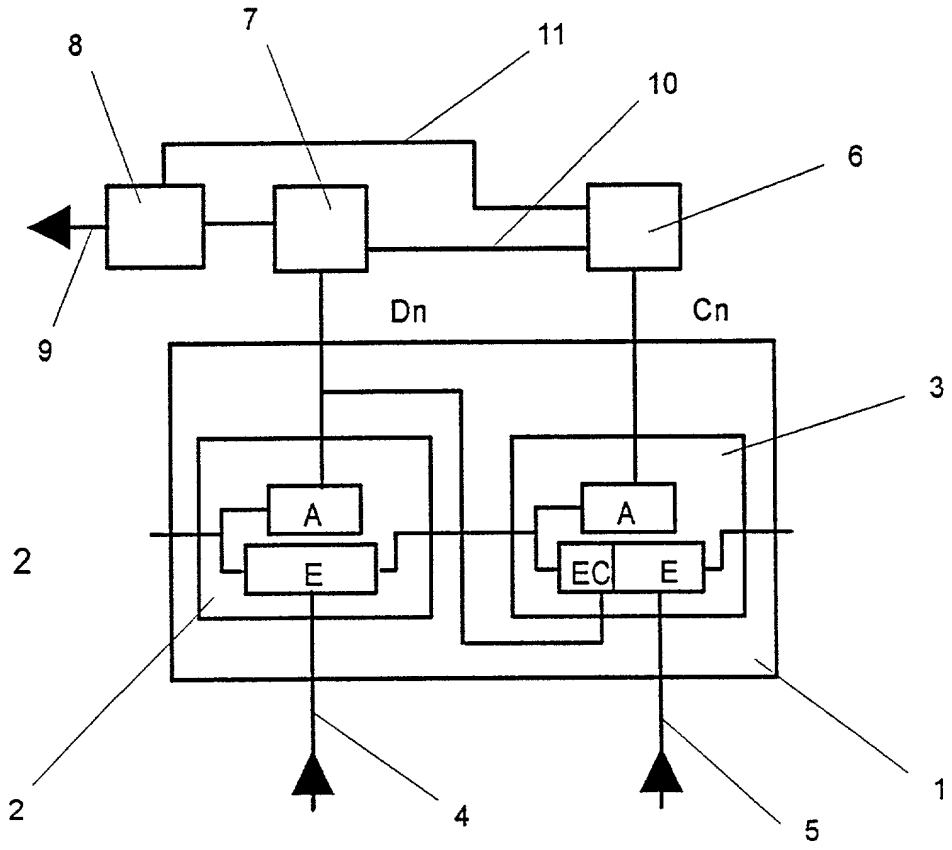

Fig. 2

Docket No.
(H)01PH0389USP

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled
Circuit for Carrying out Secured Data Transmission, Especially in Ring Systems

09/926,959 Jun 13 2002

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on **June 5, 2000** as United States Application No. or PCT International Application Number **PCT/EP00/01796**

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed
199 25 693.4	**Germany**	**04/06/1999**	☐
(Number)	(Country)	(Day/Month/Year Filed)	
			☐
(Number)	(Country)	(Day/Month/Year Filed)	
			☐
(Number)	(Country)	(Day/Month/Year Filed)	

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

M. Robert Kestenbaum Reg. No. 20,430

Send Correspondence to: **M. Robert Kestenbaum**
11011 Bermuda Dunes NE
Albuquerque, NM USA 87111

Direct Telephone Calls to: *(name and telephone number)*
M. Robert Kestenbaum (505) 323-0771 Fax (505) 323-0865

Full name of sole or first inventor **Karsten Meyer-Gräfe**
Sole or first inventor's signature — Date 20.03.02
Residence **Lupinenweg 8, D-33161 Hövelhof, Germany**
Citizenship **German**
Post Office Address **Lupinenweg 8, D-33161 Hövelhof, Germany**

Full name of second inventor, if any **Thorsten ~~Gerx~~ Behr**
Second inventor's signature — Date 22.03.2002
Residence **Herder Weg 8a, D-32805 Horn-Bad Meinberg, Germany**
Citizenship **German**
Post Office Address **Herder Weg 8a, D-32805 Horn-Bad Meinberg, Germany**

Full name of third inventor, if any ~~Wolfram Kress~~XXXXXXXXXX Wolfram Kress
Third inventor's signature Date X26.03.02
Residence **Auf dem Gerotten 16, D-53721 Siegburg, Germany**
Citizenship **German**
Post Office Address **Auf dem Gerotten 16, D-53721 Siegburg, Germany**

Full name of fourth inventor, if any **Peter Wratil, Dr.**
Fourth inventor's signature Date March 29th, 2002
Residence **Heinrich-Wildung-Weg 3, D-21224 Rosengarten, Germany**
Citizenship **German**
Post Office Address **Heinrich-Wildung-Weg 3, D-21224 Rosengarten, Germany**

Full name of fifth inventor, if any
Fifth inventor's signature Date
Residence
Citizenship
Post Office Address

Full name of sixth inventor, if any
Sixth inventor's signature Date
Residence
Citizenship
Post Office Address

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/009,444	**PCT/DE00/01496**	**(H)01PH0389USP**

24. The following fees are submitted:.

CALCULATIONS PTO USE ONLY

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

- ☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1040.00**
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$890.00**
- ☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$740.00**
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$710.00**
- ☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$0.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$130.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	- 20 =	0	x $18.00	**$0.00**	
Independent claims	- 3 =	0	x $84.00	**$0.00**	
Multiple Dependent Claims **(check if applicable)**.			☐	**$0.00**	

TOTAL OF ABOVE CALCULATIONS =	**$130.00**	
☐ Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.	**$0.00**	
SUBTOTAL =	**$130.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +	**$0.00**	
TOTAL NATIONAL FEE =	**$130.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☒	**$40.00**	
TOTAL FEES ENCLOSED =	**$170.00**	
	Amount to be: refunded	$
	charged	$

05/16/2002 LLANDGRA 00000023 10009444
01 FC:154 130.00 OP

a. ☒ PTO-2038 in the amount of **$170.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **11-0665** A duplicate copy of this sheet is enclosed.

d. ☒ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

M. Robert Kestenbaum
11011 Bermuda Dunes NE
Albuquerque, NM USA 87111
Phone (505) 323-0771
Fax (505) 323-0865

M. Robert Kestenbaum
SIGNATURE

M. Robert Kestenbaum
NAME

20,430
REGISTRATION NUMBER

April 26, 2002
DATE

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/009,444	PCT/DE00/01496	(H)01PH0389USP

24. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO	**$1040.00**	
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Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$130.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	- 20 =	0	x $18.00	**$0.00**	
Independent claims	- 3 =	0	x $84.00	**$0.00**	
Multiple Dependent Claims **(check if applicable).**			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS =				**$130.00**	
☐ Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.				**$0.00**	
SUBTOTAL =				**$130.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
TOTAL NATIONAL FEE =				**$130.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☒				**$40.00**	
TOTAL FEES ENCLOSED =				**$170.00**	
				Amount to be: refunded	$
				charged	$

a. ☒ PTO-2038 in the amount of **$170.00** to cover the above fees is enclosed.

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NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Albuquerque, NM USA 87111
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M. Robert Kestenbaum
SIGNATURE

M. Robert Kestenbaum
NAME

20,430
REGISTRATION NUMBER

April 26, 2002
DATE

JC20 Rec'd PCT/PTO 09 MAY 2002

FORM PTO (REV 11-2000) [redacted] OMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY DOCKET NUMBER: **(H)01PH0389USP**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR): **10/009,444**

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/01496	**June 5, 2000**	**June 4, 1999**

TITLE OF INVENTION

Circuit for Carrying-out Secured Data Transmission, Especially in Ring Systems

APPLICANT(S) FOR DO/EO/US

Meyer-Grafe

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☐ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☒ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include itens (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☐ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☐ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

First Class Mail Certification